

CLAIMS

1. An image display device that with it being supported by a portion other than a user, is in contact with the face of the user and is movable in accordance with the movement of the face of the user, said image display device being characterized in that the gravity center of said image display device is, when it is worn by the user, located on the nearer side of the occipital region compared with the eyeballs and on the nearer side of the neck compared with the eyeballs.
2. An image display device according to claim 1, characterized in that the gravity center of said image display device substantially coincides with the average, 3-axes' rotational movement center of the neck of a human who is supposed to use said image display device.
3. An image display device that with it, by a portion other than a user, being supported so that said image display device is movable in the three-dimensional directions in space and being supported so that said image display device is rotationally movable in the three-dimensional directions, is in contact with the face of the user and is movable and rotationally movable in accordance with the movement of the face of the user, said image display device being characterized in that it has a plurality of rotational movement shafts of said image display device and in that each of the rotational movement shafts passes through the vicinity of the gravity center of said image display device.
4. An image display device according to claim 1 that with it, by a portion other than a user, being supported so that said image display device is movable in the three-dimensional directions in space and being supported so that said image display device is rotationally movable in the three-dimensional directions, is in contact with the face of the user and is movable and rotationally movable in accordance with the movement of the face of the user, said image display device being characterized in that each of the rotational movement shafts of said image display device passes through the vicinity of the gravity center of said image display device.
5. An image display device according to claim 3 or 4, characterized in that to each of said rotational movement shafts is set a rotational movement amount measuring sensor and in that said image display device has a computing device that determines the output image of said image display device in accordance with the outputs from said rotational movement amount measuring sensors.
6. An image display device according to claim 1 or 3, characterized in that said image display device is connected by a string-like flexible member with a

counterweight and in that by suspending, via a pulley set on a two-dimensional-direction driving mechanism movable on a horizontal flat surface supported by the floor, said image display device and counterweight, said string-like flexible member supports said image display device.

5 7. An image display device according to claim 1 or 3, characterized in that said image display device is, via sandwiching means for sandwiching the face from the right and left side face directions that function also as earphones, in contact with the face of the user and in that the positional relationship between the face and said image display device is substantially fixed by said sandwiching means.

10 8. An image display device according to claim 1 or 3, characterized in that said image display device has a function of projecting and imaging, via a relay optical system, a light emitted from a two-dimensional type image forming device onto the retinas in the right and left eyeballs, with the imaged image being a wide range image having a field of view angle of ± 22.5 degrees or more.

15 9. An image display device according to claim 1 or 3, characterized in that said image display device has a two-dimensional type image forming device, first (for the right eye use) and second (for the left eye use) light diffusing bodies, first (for the right eye use) and second (for the left eye use) relay optical systems that respectively relay a light emitted from said two-dimensional type image forming device to the first (for the right eye use) and second (for the left eye use) light diffusing bodies, and first (for the right eye use) and second (for the left eye use) eyepiece optical systems that respectively project and image the transmitted images of said first and second diffusing bodies onto each of the retinas in the right and left eyeballs.

25 10. An image display device according to claim 9, characterized in that said image display device has an adjusting mechanism that adjusts the distance between the optical centers of said first and second eyepiece optical systems and the distance between the first transmitted image and the second transmitted image having transmitted through said light diffusing bodies so that those distances become equal to the eye-width of the user.

30 11. An image display device according to claim 9, characterized in that said light diffusing bodies, which diffuse light, are each a transmission type diffusing plate constituted by a transmission plate on which abrasive grains of a metal oxide or metallic carbide of which grain diameter is precisely controlled with micron-grade are coated.

35 12. An image display device according to claim 11, characterized in that said abrasive grains are made of at least one of silicon carbide, chromium oxide, tin oxide, titanium oxide, magnesium oxide, and aluminum oxide and in that said transmission

plate is a polyester film.

13. An image display device according to claim 8, characterized in that said two-dimensional type image forming device has three pieces of two-dimensional transmission type or reflection type liquid crystal device elements, each corresponding
5 to each of the colors of green (G), blue (B), and red (R), which are perpendicular to the light beam emitting direction, an illumination device that illuminates said liquid crystal device elements, and an image combining device that combines the lights emitted from said liquid crystal device elements into a single image.

14. An image display device according to claim 9, characterized in that said
10 two-dimensional type image forming device has three pieces of two-dimensional transmission type or reflection type liquid crystal device elements, each corresponding to each of the colors of green (G), blue (B), and red (R), which are perpendicular to the light beam emitting direction, an illumination device that illuminates said liquid crystal device elements, and an image combining device that combines the lights emitted from
15 said liquid crystal device elements into a single image.

15. An image display device according to claim 9, characterized in that with respect to each of said first and second eyepiece optical systems, at least one surface of the lenses constituting is made to be a conic surface with conic constant $K < 0$ and in that each of said eyepiece optical systems has at least two cemented lenses.

16. A simulation device that uses the image display devices according to claim 1 or 3, characterized in that said simulation device has a for-somesthesia-purpose driving portion that in accordance with an image displayed on said image display device, gives a for-somesthesia-purpose stimulus other than an acoustic stimulus to a user or controls the posture of the user.

17. A simulation device, which uses the image display device, according to claim 16, characterized in that said for-somesthesia-purpose driving portion has an air blowing mechanism that blows air from ahead of said image display device and in that said air blowing mechanism has a function of varying the air blowing amount in accordance with the virtual movement speed somesthetically felt through the image displayed on
30 said image display device.

18. A simulation device according to claim 17, characterized in that said air blowing mechanism has a control mechanism that controls the air blowing temperature.

19. A simulation device according to claim 17, said air blowing mechanism has a control mechanism that controls the fragrance during the air blowing.

20. A simulation device, which uses the image display device, according to claim 16, characterized in that said simulation device has operating means by which the user

controls with his or her hand or foot the virtual movement speed somesthetically felt through the image displayed on said image display device.

21. A simulation device according to claim 20, characterized in that said operating means is provided with an emergency switch.

5 22. A simulation device, which uses the image display device, according to claim 16, characterized in that said for-somesthesia-purpose driving portion has a control device that inclines a portion supporting the user in accordance with the user's body inclination somesthetically felt through the image displayed on said image display device.

10 23. A simulation device according to claim 22, characterized in that said portion supporting the user supports the user in a state of standing or walking.

24. A simulation device according to claim 22, characterized in that said portion supporting the user supports the user in a state of sitting or in a state of sitting and rowing with feet.

15 25. A simulation device according to claim 22, characterized in that said portion supporting the user supports the user in a state that the user is lying and a portion of the user's body is suspended upwardly or in a state that the user's entire body is supported by the user's portion other than feet and buttocks.

20 26. A simulation device according to claim 16, wherein either one of a high-definition image or an image formed by a computer is selected and displayed on said image display device, said simulation device being characterized in that it has a function that when the high-definition image is displayed, said for-somesthesia-purpose driving portion is controlled with a sequence predetermined in accordance with the display of the high-definition display and that when the image formed by the computer is displayed, the image is formed by the computer and said for-somesthesia-purpose
25 driving portion is controlled, in response to input information inputted by the user through an operating portion.

27. A simulation device according to claim 16, wherein a high-definition image and an image formed by a computer are combined and displayed on said image display device, said for-somesthesia-purpose control portion being characterized in that it has a
30 function of controlling with a sequence predetermined in accordance with the display of the high-definition display said for-somesthesia-purpose driving portion and of, on the other hand, forming by the computer an image in response to input information inputted by the user through an operating portion.

28. A simulation device according to claim 26, characterized in that said simulation
35 device has a first two-dimensional image forming device that forms a high-definition image and a second two-dimensional image forming device that forms an image formed

by a computer and has means that combines optically or electrically the image of said first two-dimensional image forming device and the image of said second two-dimensional image forming device.

29. A simulation device according to claim 28, characterized in that said simulation
5 device has high-definition image information having a wider region than the high-definition image information displayable with said first two-dimensional image forming device and has a function of having, in accordance with the outputs of a detecting device that detects the direction of the user's face when the user wears said image display device, a portion of said high-definition image information having a
10 wider region formed on said first two-dimensional image forming device.